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MANPOWER CONSIDERATIONS IN THE PROVISION

OF

DENTAL CARE IN CANADA

by



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A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF MASTER OF ARTS

DEPARTMENT OF ECONOMICS

EDMONTON, ALBERTA

FALL, 1971





UNIVERSITY OF ALBERTA  
FACULTY OF GRADUATE STUDIES

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled Manpower Considerations in the Provision of Dental Care in Canada submitted by E. W. Jacobson in partial fulfilment of the requirements for the degree of Master of Arts.

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## ABSTRACT

Shortages in health care have not been met adequately by existing health professions and the existing health care delivery system. New health professions with shorter training periods and highly specialized tasks have developed to help overcome shortages of health care. One such profession that has developed to assist dentists is that of dental hygiene. More fundamental changes in the method of providing care have not occurred. The present framework may not be the one which uses the new (and the established) personnel the most effectively.

This paper shall discuss dental personnel and their role in the present and future framework of delivering dental care.



### ACKNOWLEDGEMENTS

I wish to thank my supervisor, Professor B.R. McKellips for his assistance and penetrating observations. A further debt is owed to Professor R.H. Plain who read the paper and made many pertinent comments.

I am grateful to Dr. A.T. Salter of the Alberta Department of Public Health and Mrs. M.B. MacLean of the University of Alberta, School of Dental Hygiene for providing me with a great deal of information.

Finally, to my wife Barbara goes many thanks for her encouragement and invaluable assistance.





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## CHAPTER ONE

### INTRODUCTION

#### Objectives

Utilizing data and literature concerning dental care, this study examines shortages of dental care and manpower problems involved with dealing with these shortages. The study is largely descriptive, and little rigorous economic analysis is involved.

Prime objectives of the study are to delineate the problems of providing an adequate level of dental care, to explore the role of various personnel in the provision of dental care, and to examine the consequences of proposed changes in the method of providing dental care. In the course of the discussion, certain relevant statistical tables will be presented and analysed.

The study will provide some information about the problems of the dental service industry that will be useful to those who may wish to conduct more intensive research concerning the dental care sector.

#### Outline

The nature and distinctive aspects of dental care are examined in order to specify the characteristics of the industry. Before analysing the role of auxiliaries in combatting shortages of dental care, the existence of shortages and the means of measuring these shortages are examined. This discussion is necessary in order to establish that dental care is indeed in economic shortage.

Given that shortages in output of dental care exist, the question of how to eliminate the shortages is dealt with. This is begun with a discussion of the role of dental auxiliary personnel in the present





system of delivery of care. This discussion is necessary in order to examine the place of the personnel who are said to have the greatest potential to expand output of dental care.

Another more fundamental method of dealing with shortages is by radically changing the existing system of providing dental care. The merits of a change in the institutional framework and possible changes are discussed in the context of a proposal to establish a universal national dental care program.

### Related Studies

Several studies in recent years have explored economic and social aspects of the dental service industry. The Commission on the Survey of Dentistry in the United States undertook a study to "determine whether or not a given profession (the dental profession) is fully meeting its current and prospective responsibilities."<sup>1</sup> This study made several recommendations to improve the output of dental services in the areas of dental health of the public, dental practice, dental education, and dental research.

The Royal Commission on Health Services<sup>2</sup> in Canada also examined the dental profession. Their study, completed in 1964, pointed out the inadequacies in the present output of dental services, and suggested increased use of auxiliaries, as well as a national dental care program

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<sup>1</sup>Commission on the Survey of Dentistry in the United States, Final Report, The Survey of Dentistry (Washington, D.C.: American Council on Education, 1961).

<sup>2</sup>Report of the Royal Commission on Health Services, E. Hall, Chairman (Ottawa: Queen's Printer, 1964).



for children. A study performed by McFarlane<sup>3</sup> for the commission added to the knowledge of the existing pattern of dental care.

Ontario established a Committee on the Healing Arts in 1966. Their report<sup>4</sup> and related studies were published in 1970. This report makes forty-two recommendations relating to dentistry. Related studies commissioned by the Committee were done by House<sup>5</sup> who examined problems relating to the delivery of dental services in an economic framework; and Fraser,<sup>6</sup> who examined the merits of the dentist and the dental health nurse in a universal program of dental care for children.

In 1968, the Department of National Health and Welfare established the Ad Hoc Committee on Dental Auxiliaries. Their report,<sup>7</sup> published in 1970, makes several recommendations concerning increased utilization of auxiliary personnel and the need to change the present method of providing dental care.

The above studies provided the bulk of the information used in this thesis.

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<sup>3</sup> B.A. McFarlane, Dental Manpower in Canada (Ottawa: Queen's Printer, 1965).

<sup>4</sup> Report of the Committee on the Healing Arts, Ian Dowie, Chairman (Toronto: Queen's Printer, 1970).

<sup>5</sup> R. House, Dentistry in Ontario (Toronto: Queen's Printer, 1970).

<sup>6</sup> R. Fraser, Selected Economic Aspects of the Health Care Sector in Ontario (Toronto: Queen's Printer, 1970).

<sup>7</sup> Report of the Ad Hoc Committee on Dental Auxiliaries, Dalton Wells, Chairman (Ottawa: Information Canada, 1970).





## CHAPTER TWO

### THE NATURE OF DENTAL CARE

Dental care consists of the treatment of dental disease, prevention of dental disease, and education of the public concerning ways to maintain dental health. Most dentists presently concentrate upon treatment.

One of the characteristics of dental care is that relatively few people demand it, but all people need it: "The need for dental care is universal yet less than one third of the population receives any treatment at all during a year."<sup>1</sup> The reasons given for this phenomenon are an inability to afford dental care, lack of knowledge as to the value of dental care, fear of dentists, or apathy. Sections of the population that are unlikely to seek dental care include those in rural areas and those with a low education level.

Demand would not likely correspond to need for dental care even if the payment for services was government financed. There are many people who feel that dental disease and dental caries present no major threat to their well-being. "Dental illness is generally not fatal; while it may be very painful, the pain can usually be relieved by extraction."<sup>2</sup> Dental disease just does not have the same urgency in the public mind as a medically treated disease. "The idea of dental care as a luxury good rather than as a necessity is reflected on the one hand in the widespread public apathy towards dental disease (wherein the loss of teeth is considered a natural part of the aging

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<sup>1</sup>Canadian Dental Association, A Brief Submitted to the Royal Commission on Health Services (Toronto: The Canadian Dental Association, 1962), p. 12.

<sup>2</sup>Robert Kohn. Emerging Patterns in Health Care (Ottawa: Queen's Printer, 1965), p. 21.



process), and on the other hand in the elective nature of most dental treatment."<sup>3</sup>

However, dental care has been suggested to be just as necessary to an individual as medical care, and good dental health is an important part of good general health. "The permanently septic state of the mouth results in a tremendously high incidence of dental and periodontal disease, with debilitating consequences upon general health."<sup>4</sup>

The following table gives some indication of the importance of dental care in per capita expenditure on health services. These per capita figures include all those who have had no dental care in a given year.

The treatment of dental caries involves examination and diagnosis, treatment services, and post-treatment services. The dentist usually spends the bulk of his time with treatment, simply because the load of his practice dictates this decision. The sheer volume of caries to be treated leaves him little time for preventive measures.

Preventive dentistry involves those procedures which try to prevent or minimize the seriousness of dental disease. It has been estimated that "...eighty percent or more of the caries process can be prevented if a dentist applies up-to-date scientific knowledge of prevention and the techniques and obtains the patient's full co-operation in respect to oral hygiene, diet and regular re-call duties."<sup>5</sup>

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<sup>3</sup>R.K. House, Dentistry in Ontario (Toronto, Ont.: Queen's Printer, 1970), p. 89.

<sup>4</sup>G.H. Sperber, "Interrelationship of oral and general health" Journal of the Canadian Dental Association. Vol. 31 (November, 1965), 731.

<sup>5</sup>J. Kreutzer, "Review of the Developments in Preventive Dentistry" Journal of the Canadian Dental Association, Vol. 32, quoted in R.D. Fraser, Selected Economic Aspects of the Health Care Sector in Ontario (Toronto: Queen's Printer, 1970) p. 130.



TABLE I

PER CAPITA EXPENDITURES ON DENTISTS' SERVICES,CANADA, BY PROVINCE, 1959 - 1968

PROVINCE	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968
Newfoundland	\$1.43	1.70	1.98	1.85	2.21	2.25	2.38	2.76	2.70	3.18
Prince Edward Island	\$3.87	3.81	3.93	5.92	4.45	4.21	4.79	5.54	5.13	5.74
Nova Scotia	\$2.96	3.27	3.48	3.54	3.62	4.71	4.88	5.75	5.51	5.73
New Brunswick	\$2.91	3.26	3.42	3.50	3.87	4.09	4.53	4.63	4.53	5.66
Quebec	\$3.41	4.02	3.96	3.98	4.68	4.91	5.25	5.77	6.07	6.84
Ontario	\$7.69	8.08	8.54	8.89	9.62	10.28	10.95	11.70	11.93	13.36
Manitoba	\$5.01	6.19	6.64	6.39	6.77	7.26	7.52	7.83	8.65	10.08
Saskatchewan	\$4.45	4.93	5.27	4.95	5.45	6.01	6.05	6.87	7.08	7.76
Alberta	\$6.17	6.79	6.99	7.50	8.11	8.54	9.20	9.86	10.84	11.60
British Columbia	\$8.61	9.31	9.84	9.79	11.18	11.05	11.64	12.35	13.04	14.72
Canada	\$5.65	6.12	6.39	6.54	7.22	7.65	8.13	8.80	9.16	10.29

Source: Canada, Department of National Health and Welfare, Earnings of Dentists in Canada 1959-1968  
(Health Care Series No. 26), p. 41.





Dental caries, however, is not the only problem; "With advancing age, dental caries accounts for a smaller share of the total dental needs than does periodontal disease."<sup>6</sup> Periodontal disease is one of the main reasons that people must have their teeth extracted and be fitted with dentures. However, preventive measures for this do exist: "Periodic cleaning and scaling of the teeth, particularly below the gum line, is a potent weapon against periodontal disease."<sup>7</sup>

The problem with many preventive measures is that they are quite time-consuming. For example, applying a topical solution to children's teeth takes at least an hour and a half per patient per year; however, this has been estimated to save only one quarter of an hour per patient per year in treatment time."<sup>8</sup>

The fact that dental disease is viewed differently by the public than diseases treated by medical doctors affects the delivery of care. Treatment is not universal, and prevention and public education are needed to lower need and raise demand.

In order to justify certain preventive services, it would seem that one must make a value judgement that it is better to prevent dental disease than to treat it once it has appeared. If a person needs treatment, this implies a certain deterioration in dental health. Dental caries cannot be 'cured' in the sense of healing a decayed tooth, but only repaired by a filling. Using this idea, one can state that dental caries are irrevocable and a better way of preserving teeth is to prevent cavities rather than having to repair them. In the long run the

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<sup>6</sup>W.O. Young and D.F. Striffler, The Dentist, his Practice, and his Community (Toronto: W.B. Saunders Company, 1969) p. 277.

<sup>7</sup>B.S. Hollinshead, Dentistry in the United States (Washington: American Council on Education, 1960), p. 10.

<sup>8</sup>R.D. Fraser, Selected Economic Aspects of the Health Care Sector in Ontario (Toronto: Queen's Printer, 1970) pp 132-133.





philosophy of prevention is advantageous if it permits people to retain their teeth over their lifetime instead of being compelled to eventually obtain false teeth. Expenditures upon dental care thus may be viewed as an investment in the future of one's own teeth; however, there is some evidence<sup>9</sup> that preventive measures such as topical applications may merely postpone cavities rather than prevent them.

Public education is really an aspect of prevention. It involves convincing the public of the value of preventive dental measures that can be taken in the home. This includes lectures concerning diet and nutrition, oral hygiene, fluoride use, and the value of regular checkups which include a prophylaxis.

The present system of delivery that is predominantly private practice fee for service has not provided adequate service to disadvantaged groups. "Although it has been accepted widely, in theory at least, that society has a responsibility to provide dental care for the needy, the amount of dental care available to indigent families and those with marginal incomes varies considerably, and is often non-existent. Because of a lack of public programs adequate to meet the need, a significant part of the population has received no more than relief of pain and emergency extractions and can expect an early loss of teeth."<sup>10</sup>

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<sup>9</sup>Fraser, op. cit., p. 132.

<sup>10</sup>Young and Striffler, op. cit., p. 248.



### CHAPTER THREE

#### SHORTAGES OF DENTAL CARE:

#### THEIR EXISTENCE AND MEASUREMENT

Dental care in Canada has been suggested to be in short supply; however, the underlying criteria involved in this statement have not been analysed. It must be determined whether the frame of reference is an economic shortage or a shortage perceived by a standard of need. The mere discussion of a shortage involves certain value judgements. "Whether a shortage in fact exists depends upon public choice. A shortage exists if once the public choice of the desired level of services is made, the existing manpower and facilities are insufficient to provide the chosen level of services."<sup>1</sup> Public choice thus involves setting some specific target of amount of service to be provided an an amount of manpower that is required. If public choice was the establishment of a universal dental care program, need would still not be the relevant variable, since a financial barrier is not the only reason people do not seek dental care. As well, need has no real economic significance. Demand is inversely related to price, but need is independent of price. If personnel are provided up to the point of fulfilled universal need with free service to the public, and people do not demand this level of care, there will be unused manpower, and expenditures on these manpower resources will have been a waste. To avoid this problem, a more accurate estimate of effective demand under a universal program would have to be made. A good proxy could be obtained by examining "the current rates of use of services by a defined population with access to comprehensive

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<sup>1</sup>I. Dowie, Report of the Committee on the Healing Arts, Vol. I (Toronto: Queen's Printer, 1970) p. 137.



services at moderate cost, as exemplified by subscribers to a prepaid group practice plan."<sup>2</sup> In order to further augment demand for dental care (or health care generally); "It is also necessary that the population be aware of the value of health services or persuaded to seek them."<sup>3</sup>

Need cannot be accepted as a standard for suggesting a shortage exists; a more economically oriented approach is required. "Simply described, an economic shortage exists when the amount of something demanded by the public exceeds the amount supplied at the existing market price."<sup>4</sup> In a market characterized by perfect competition, such a shortage would result in a higher price, which would lower demand for the service and increase the amount supplied until a new equilibrium was reached. The dental care market, however, is not a perfectly competitive one. It is characterized by elements of imperfect competition: restriction of entry into the dental profession due to few places in dental schools, imperfect consumer knowledge of the output, price setting with no opportunity for price competition, and lack of a substitute product. Thus, a different reaction occurs.

A shortage does not result in an increase in prices (dentists' fees) in the short run. Instead, shortages are reflected by lengthening waits for appointments. Dentists are not necessarily profit maximizers, so fees are not raised in response to increases in queues, but rather at certain intervals independent of changes in supply and demand. The

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<sup>2</sup>H. Klarman, "Economic Aspects of Projecting Requirements for Health Manpower" Journal of Human Resources, Vol. IV (Summer, 1969) p. 362.

<sup>3</sup>Ibid., p. 361.

<sup>4</sup>D. Yett, "The Chronic "Shortage" of Nurses" Empirical Studies in Health Economics. ed. by H.E. Klarman (Baltimore: John Hopkins Press, 1970) p. 358.





rationale for the periodic fee increases is usually increased costs and a need to keep incomes in line with those of other professional groups.

Instead, dentists are hypothesized to be satisficers with respect to income, and are utility maximizers with respect to the tradeoff between income and leisure. They are satisficers because their high net annual incomes provide a high standard of living in relation to the majority of the populace.

The existence of high net annual incomes is tied to the existence of imperfect competition in the market for dental services. The price charged for dental care is probably above the marginal cost of these services because the market is not perfectly competitive. Thus, the public is charged more than the good's social cost. The dental profession's position is reinforced by the fact that the price elasticity of demand for dental care is less than one<sup>5</sup> (for those who seek dental care). Thus the dental profession faces an inelastic demand curve for dental care, and it can use the resultant power to keep the price of the service above marginal cost.

The dental profession may argue that any return above the return at a perfectly competitive level is justified by the need to restrict output in order to maintain quality at a high level. Such an argument can only be evaluated by a dentist, for other investigators do not have the requisite knowledge. The dental profession's concept of the desired level of quality and the cost of maintaining quality may be different than the concept of an independent investigator. While the quality argument can be valid, it may be motivated by self interest on the part of the dental profession.

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<sup>5</sup>M. Friedman and S. Kuznets, Income from Independent Professional Practice (New York: National Bureau of Economic Research, 1954), p. 169.





This is not an attack upon individual dentists; it is merely an observation that the profession as a whole is not providing society with maximum value for the money spent on dental care.

### Personnel to Population Ratios

The institutional literature (i.e. articles in dental journals) generally agree that a shortage of dental care exists in Canada. This conclusion is usually based upon Canada's dentist : population ratio. This ratio is simply calculated by dividing the population of Canada by the number of dentists in Canada.

Once a ratio is calculated it can be employed in two ways; a standard of present utilization or a standard of need.

The standard of present utilization involved international comparisons of dentist : population ratios. Usually it is assumed that the highest ratio of dentists to population should be strived for. For example, the following are ratios for different developed countries in various years (the statistics were not gathered in all countries for one specific year.)

Sweden has the best ratio, 1:1500. It is then assumed that this is a rough guide of what Canada should strive for.



TABLE II

DENTIST : POPULATION RATIOS

Sweden	1:1500 (1958)
United States	1:1900 (1961)
Australia	1:2300 (1956)
New Zealand	1:2600 (1959)
Canada	1:3100 (1962)
Canada	1:2875 (1970)

Source: B.A. McFarlane, Dental Manpower in Canada, (Ottawa: Queen's Printer, 1965); for 1970, Canada: the Canadian Dental Association.

The disparities in dental care in regions of Canada are exhibited by Table III, which breaks down dentist:population ratios by provinces. The ratio for Canada as a whole in 1962 is different from the ratio given in the previous table. This is due to one table being the ratio of all dentists to population, while the other is the ratio of private practice dentists to population.

A further problem of dental care shortages is the provision of dental services to rural areas. Because towns in these areas typically lack many of the amenities found in larger cities, highly trained personnel are reluctant to move to these areas. In addition, a lower level of demand and appreciation of dental health usually results in less thriving practices in rural communities. Table IV gives the number of dentists and the population for census districts in Alberta in 1963 (Census district 11 contains Edmonton, 6 contains Calgary and 8 contains Red Deer).



TABLE III

ESTIMATED POPULATION PER DENTIST IN PRIVATE PRACTICE,  
CANADA, BY PROVINCE IN SELECTED YEARS FROM 1959 to 1968

	<u>1959</u>	<u>1962</u>	<u>1965</u>	<u>1968</u>
NEWFOUNDLAND	11,025	11,725	12,842	9,236
PRINCE EDWARD ISLAND	3,290	3,821	4,037	4,231
NOVA SCOTIA	5,035	5,609	4,320	4,720
NEW BRUNSWICK	5,500	5,171	4,805	5,531
QUEBEC	3,909	4,016	4,027	4,031
ONTARIO	2,547	2,624	2,678	2,697
MANITOBA	3,405	3,618	3,697	3,627
SASKATCHEWAN	4,908	4,952	4,827	5,005
ALBERTA	3,303	3,415	3,359	3,353
BRITISH COLUMBIA	2,578	2,467	2,481	2,519
YUKON AND N.W.T.	17,000	20,000	14,000	9,200
CANADA	3,248	3,319	3,312	3,319

Source: Canada, Department of National Health and Welfare, Earnings of Dentists in Canada, 1959 - 1968 (Health Care Series, No. 26), p. 18.



TABLE IV  
DENTISTS IN ALBERTA CENSUS DISTRICTS IN 1963

Census District	No. of Dentists	Population	Population/ Dentist Ratio
1	9	39,140	4,349
2	26	83,306	3,204
3	5	30,967	6,193
4	2	15,020	7,510
5	8	38,115	4,764
6	145	317,989	2,193
7	9	40,837	4,537
8	21	76,533	3,644
9	6	20,274	3,379
10	10	70,177	7,018
11	193	410,679	2,128
12	7	47,310	6,759
13	4	43,431	11,358
14	3	19,282	6,427
15	11	76,884	6,989

Source: B.A. McFarlane, op. cit., p. 43.





The data show that with the exception of the districts containing larger urban centres, there is a very unfavourable population:dentist ratio. As well, the rural practice is more likely to contain a single dentist. Thus, besides a shortage of dental care in Canada as a whole, there is a greater relative shortage in rural areas compared to urban areas.

The other use of the dentist:population ratio is a measure of need. In medicine, Lee and Jones<sup>6</sup> used the following procedure: "(a) determining the frequency of occurrence of illnesses in the nation's population (incidence or prevalence is not specified); (b) gathering a consensus among experts regarding the number of services required to treat and diagnose a given illness; (c) estimating the number of services rendered per hour by a provider; and (d) securing agreement on the average number of hours that a provider spends per year in caring for patients."<sup>7</sup> The prominent feature of estimating need is that this method substitutes "professional judgement for consumer choice as the guide for policy in a field in which the market works imperfectly."<sup>8</sup> Any estimate of need by a professional; however, will also involve certain value judgements about a desirable level of need. An estimate that has been made using this procedure suggests that a desirable ratio of dentists:population is 1:1200.

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<sup>6</sup>R. Lee and L. Jones, The Fundamentals of Good Medical Care (Chicago: University of Chicago Press, 1933).

<sup>7</sup>H.E. Klarman, "Economic Aspects of Projecting Requirements for Health Manpower", Journal of Human Resources, Vol. IV (Summer, 1969), p. 363.

<sup>8</sup>H.E. Klarman, The Economics of Health (New York: Columbia University Press, 1965), p. 97.



House warns against putting too much weight in comparisons of dentist:population ratios: "Only under the following conditions can significance be attached to the population:dentist ratios; when the conditions of practice are believed to be the same - that is, when the mix of dental personnel (for example, the ratio of hygienists to dentists) is the same or is known approximately; when the state of dental technology is known and is the same (this will often rule out intemporal comparisons of this ratio); when the training and selection of students are the same. To be safe, one might also add that the characteristics of the population must be the same".<sup>9</sup> These qualifications "rule out many international comparisons as almost meaningless, and except for relatively short time periods suggest that intertemporal comparisons have little value."<sup>10</sup>

A further defect of the dentist:population ratio is that a ratio for a country or a province ignores the geographical distribution of the population. The more interesting ratio would be disaggregated into census districts, or in some way which would give a breakdown between rural and urban areas. Since a higher level of demand for dental care is prevalent in urban areas, the same dentist:population ratio in an urban areas as in a rural area would involve greatly differing circumstances for the dentists in the two areas. The urban dentist could be heavily patronized and have a long waiting list, while the rural dentist could possibly have very few patients.

A similiar method of assessing requirements is a dental care personnel:population ratio. This ratio recognizes the growing importance

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<sup>9</sup>House, op. cit., p. 16.

<sup>10</sup>Ibid., p. 16.



of auxiliary personnel, including dental hygienists. To avoid the problem of weighting the relative importance of hygienists compared to those of dentists, one can give a dental hygienist:dentist ratio. This ratio gives a rough indication of the use of auxiliary personnel in private practice. Intertemporal comparisons of this ratio are also not too valuable, since there is the possibility that duties may have changed, or that the distribution of hygienists between those in public health and those in private practice may have changed.

Fein suggests that personnel to population ratios have little economic meaning, and suggests meaningful alternatives. "Medical manpower policy, therefore, should move beyond the maintenance of specified historically derived manpower-population ratios. It must ask whether goals can be reached in alternative less costly ways with fewer resources. ... It must consider the usefulness of various kinds of personnel. The quest is for policies that promote efficiency, if efficiency is lacking; that conserve scarce resources, if they are being wasted."<sup>11</sup>

#### Blank and Stigler's Approach

Blank and Stigler have suggested using relative salary changes to ascertain whether or not a shortage exists. They suggest that a shortage "... exists when the number of workers available (the supply) increases less rapidly than the number demanded at salaries paid in the recent past. Then salaries will rise (relative to those of other occupations) and activities which once were performed by (say) engineers must now be performed by a class of workers who are less well trained

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<sup>11</sup> Rashi Fein, The Doctor Shortage (Washington: The Brookings Institution, 1967), p. 21.





and less expensive."<sup>12</sup> Thus their measure is the relative income position of an occupational group from one point in time to another. If the group's relative position has improved, then one draws the conclusion that a shortage now exists. This is not necessarily true, for it is also possible that there is less of a surplus, a surplus position has become a shortage position, or a shortage has been aggravated.

As noted in the introduction to shortages, there may be no rise in incomes in the short run as a result of a shortage. If dentists are booked to capacity, an increase in demand is met by longer waits for appointments, not by higher fees; however, in response to more people desiring an appointment, the dentist may work longer hours, thus raising his income. Certainly, in the long run fees (and incomes, if demand is inelastic) may rise. The latter part of the Blank and Stigler definition implies that dentists would be attempting to hire auxiliary personnel (i.e. hygienists) to meet the shortage of care. "If the demand for workers is temporarily greater than the forthcoming supply, an effective increase in the supply of essential skilled workers can be secured by redividing work functions. Workers who have lesser skills or are more quickly trained can assume less demanding functions, while skilled workers concentrate on the more difficult phases of the work."<sup>13</sup>

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<sup>12</sup> D. Blank and G. Stigler, The Demand and Supply of Scientific Personnel, quoted in D.E. Yett, "The Chronic 'Shortage' of Nurses", Empirical Studies in Health Economics, ed. by H.E. Klarman (Baltimore: John Hopkins Press, 1970), p. 359.

<sup>13</sup> National Manpower Council, A Policy for Skilled Manpower (New York: Columbia University Press, 1954), p. 62.





A rough guide of the length of appointment backlogs required before hiring additional personnel is given by Young and Striffler: "When the practice has grown to the point that the dentist is booked one month in advance, it has been suggested that he is busy enough to utilize a dental hygienist."<sup>14</sup>

The problem with the Blank and Stigler approach is that one has to select a base year which is assumed to be the beginning of the shortage. It is possible that different base years would give opposite conclusions (i.e. one base year would suggest a shortage existed while a different base year would suggest that there was a surplus.) The problem is compounded by the indication that "there is no logical basis for determining the beginning of a shortage."<sup>15</sup> One way would be to examine average length of wait for dental appointment. If the length of wait at a random sample of dentists is greater than some 'reasonable' length of time, then we could hypothesize that a shortage exists.

Increased incomes in all professions may not be in response to changes in supply and demand, but may be due to changes in productivity. There are indications that high speed drills, multiple chair offices and increased use of auxiliary personnel have enhanced the productivity of dentists in recent years.

Another problem with aggregated comparisons of relative incomes is that the age distribution of members of a profession is ignored. If one profession has many members in the high earning age group, average income for this profession will be higher. As well, certain professions

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<sup>14</sup>Young and Striffler, op. cit., p. 328.

<sup>15</sup>W. Lee Hansen, "Shortages and Investment in Health Manpower" The Economics of Health and Medical Care. ed. by S.J. Axelrod (Ann Arbor: The University of Michigan, 1964), p. 80.



have different peak earning periods. Dentists, who need a good deal of stamina to continually stay on their feet, probably reach their peak earning period relatively early. As they get older, they are unable to handle as many patients. In contrast, lawyer's incomes continue to rise as they get older, due to their practice becoming larger and more well known over a period of years.

Despite its shortcomings, the relative income comparison can at least indicate trends in relative incomes. In the following table, data are presented on the net incomes of self employed professionals in Canada. This data will be used to show the trend of dentist's incomes relative to those of the other professions.

TABLE V  
AVERAGE NET INCOMES OF SELF  
EMPLOYED PROFESSIONALS IN CANADA

<u>Category</u>	<u>1959</u>	<u>1966</u>	<u>1968</u>
Physicians and surgeons	\$15,737	\$24,993	\$29,181
Engineers and architects	14,982	21,200	22,707
Lawyers and notaries	14,123	21,045	23,597
Accountants	11,033	13,946	17,002
Dentists	11,605	17,212	20,164
All Taxpayers	4,113	5,193	5,765

Source: Department of National Health and Welfare, Earnings of Dentists in Canada, 1959 - 1968.



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TABLE VI

EARNINGS OF DENTISTS EXPRESSED AS A PROPORTION  
OF EARNINGS OF OTHER GROUPS IN CANADA<sup>a</sup>

	<u>1959</u>	<u>1966</u>	<u>1968</u>
Physicians	.74	.69	.69
Engineers	.78	.815	.89
Lawyers	.825	.82	.85
Accountants	1.05	1.23	1.18
All taxpayers	2.81	3.32	4.50

<sup>a</sup>Calculated from previous table by the following ratio:

$$\frac{\text{income of dentists}}{\text{income of other group}}$$

With the exception of the comparison to physician's incomes, the earnings of dentists relative to earnings of other occupations has improved. The Blank-Stigler hypothesis would suggest that the relative shortage of dentists has worsened from 1959 to 1968. This table also suggests that the relative shortage of physicians in Canada has also worsened, and to a greater degree than the shortage of dentists.

Rate of Return Approach

An approach that considers the cost of training is rate of return analysis. In the case of medicine and dentistry, the costs of training and foregone earnings are a large outlay as the duration of training is relatively long.

This approach involves calculating an internal rate of return figure which is derived from a discount rate that "equates the present





value of the expected earnings stream to the present value of the expected outlay or cost stream."<sup>16</sup>

The internal rates of return of various professions are compared for different years. If in this case, the rate of return for dentistry has increased relative to the others examined, we can state that the shortage of dental care has worsened, or that the surplus has lessened. Per se, we cannot tell whether a surplus or shortage exists, we can merely tell the direction of movement. To ascertain whether a surplus or shortage exists, it would be necessary to select a certain standard rate of return that would exist in equilibrium. This choice would be a difficult one, and would probably be only a rough estimate.

The following are estimates of rates of return to dentists and physicians in the United States.

TABLE VII  
RATES OF RETURN TO PHYSICIANS AND  
DENTISTS IN THE UNITED STATES  
EXPRESSED IN PERCENTAGES

	<u>PHYSICIANS</u>	<u>DENTISTS</u>
1948	----	19.1
1949	24.2	----
1958	----	14.8
1959	14.7	----

Source: A. Maurizi, Economic Essays on the Dental Profession (Iowa City: University of Iowa, 1969) p. 17.

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<sup>16</sup> W. Lee Hansen, "Shortages and Investment in Health Manpower". The Economics of Health and Medical Care. Proceedings of the Conference on the Economics of Health and Medical Care. Ann Arbor, 1964. p. 81.



The above data shows that the rate of return to physicians in the United States has decreased more than the rate of return to dentists. This theoretically implies that the shortage of physicians has been largely eliminated (or has been eliminated to a greater extent than the shortage of dentists.) This table is largely illustrative, and cannot be generalized to Canada.

Whether or not a shortage exists depends upon what is meant by shortage. By a standard of need, Canada probably faces a shortage of dental care. If one means a shortage at the existing price, (i.e. fees) Canada may not face a shortage. The existing price, however, is not necessarily the relevant variable, for it does not consider costs. The social costs of dental care are likely lower than the price of dental care when one considers foregone earnings, training costs, labour costs, and capital costs. If fees were lowered to the level of costs, Canada would probably be faced with a shortage of dental care. This conclusion is reinforced by the Blank-Stigler and rate of return analyses, which are attempts to ascertain the existence of shortages when referring to a market situation where price is at the level of marginal cost.

One method of lowering costs has been suggested to be greater utilization of auxiliary personnel, especially the dental hygienist. An examination of the history and present status of this profession is required in order to ascertain how present utilization of auxiliaries may be improved.



## CHAPTER FOUR

### DENTAL AUXILIARY PERSONNEL AND THEIR STATUS IN THE PROVISION OF DENTAL CARE

Dental auxiliary personnel include dental assistants, dental hygienists, and dental technicians. In Alberta, the term auxiliary may be misleading since it is also the word used to designate dental hygienists working in public health.

Auxiliaries perform specialized functions within the dental office. A dental hygienist is the only dental auxiliary allowed to work inside the patient's mouth. The hygienist performs tasks such as scaling and polishing teeth, applying topical fluorides, taking a medical history, charting the condition of the mouth, exposing and developing x-rays, and educating patients about preventive measures to achieve dental health. Tasks a hygienist is presently forbidden to undertake in most provinces in Canada include performing a diagnosis, filling teeth, and cutting tissue. Almost all hygienists are women.

#### History

The first dental hygienists' training program was instituted in Bridgeport, Connecticut by Dr. Albert Fones in 1913. Dr. Fones had trained a hygienist in his own dental office in 1905, and had been impressed by the fact that her performance of prophylaxes (cleaning of teeth) had left him with substantially more time for more difficult dental work. By 1956, the United States had 35 schools of dental hygiene. The first training program in Canada was established in 1951 at the University of Toronto.



The University of Alberta program of dental hygiene was instituted in 1961, and the first graduates from the two year course entered the labour force in 1963. The program graduates approximately twenty hygienists per year. Until now, all graduates have been women. Other training programs exist at the Universities of Toronto, McGill, Dalhousie, Montreal and Manitoba. These programs are all affiliated with dental schools.

As of December 31, 1970, Canada had 746 licensed dental hygienists, and Alberta had 75. The ratio of hygienists to dentists is approximately 1:8 for Alberta and 1:10 for Canada.

#### Legal Controls on the Profession

The dental hygiene profession in Alberta is regulated by provisions in "The Dental Association Act" (1955, ammendments up to 1968). The Dental Association Act does not specifically enumerate permissible duties of the hygienist. Rather, a circular statement is made: "40 (1) Notwithstanding any other provision of this Act, (a) a dental hygienist may perform any dental hygiene duties."<sup>1</sup> The Act also defines what a dental hygienist is and what licensing procedure is required. "41 (1) In section 40 "dental hygienist" means a person who is certified by the secretary of the Universities Coordinating Council.

- (a) to be a graduate in dental hygiene of the Faculty  
of Dentistry of the University or,

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<sup>1</sup>Government of the Province of Alberta, The Dental Association Act (Chapter 82 of the Revised Statutes of Alberta, 1955, with ammendments up to and including 1968), p. 15.





- (b) to be a graduate of a school of dental hygiene at which the standards required for graduation are at least equal to the standards required by the Faculty of Dentistry at the University of Alberta, or
- (c) to be the holder of qualifications which at the time they were obtained, were at least the equivalent of the standards required for certification as a dental hygienist under this Act at that time.

(2) A certificate shall not be issued under clause (c) of subsection (1) to a person whose qualifications were obtained prior to the period of five years immediately preceding the date of the application, unless that person:

- (a) produces evidence satisfactory to the secretary of the Universities Coordinating Council that she has been active in practice as a dental hygienist throughout the major part of that five year period, or
- (b) satisfies the Universities Coordinating Council of her competence as a dental hygienist by examination or otherwise.<sup>2</sup>

The fact that the act pertaining to one professional body (the dentist) regulates another professional body (the dental hygienists) implies that the Dental Association has certain powers over the dental hygienist in Alberta. This may not be in the best interests of the dental hygienist profession, for it is possible that certain decisions made may be favourable to the dental profession but unfavourable to the dental hygiene profession.

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<sup>2</sup> Ibid., pp. 15-16.



The dental auxiliary (which is the name given to dental hygienists in public health) is also regulated by "An Act Respecting Dental Auxiliaries" (1960). This act specifies that the dental auxiliary requires an annually renewable license to practice, that the services performed are under the supervision of a dentist, and that the auxiliary may not charge or collect a fee for services directly from the public.

### Debate on Future Status of the Hygienist

Government bodies, the dental profession, and the dental hygiene profession in Canada are involved in a continuing debate relating to the status of the dental hygiene profession and the nature of the hygienists' duties. Experiences in New Zealand and the United Kingdom have relevance to Canada.

New Zealand has a universal government program to care for the teeth of children. The great majority of the dental work performed on children, including the treatment of cavities, is the responsibility of the dental health nurse. These nurses undertake a two year training program, and upon completion work in the school dental services with very little supervision.

According to the sampling done by J.T. Fulton<sup>3</sup>, the dental health of children in New Zealand in the seven to fourteen age group is very good. Seven year olds had 95 percent of their attacked teeth filled, and fourteen year olds had 86 percent of their attacked teeth filled. The quality of fillings was adequate, office hygiene was excellent, and patient management involved no problems.

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<sup>3</sup>J.T. Fulton, Experiment in Dental Care (Geneva: World Health Organization, 1951).



The Great Britain study<sup>4</sup> found that most of the work done by dental auxiliaries from their two year training program was of high quality. In this program, the work is more closely supervised than in New Zealand. The Great Britain auxiliaries also fill the teeth of children, but they do so under the direct supervision of a dentist.

In 1964 the Report of the Royal Commission on Health Services recommended that a national dental care program for children be instituted as soon as possible in Canada. They proposed that a new type of dental auxiliary similar to those in New Zealand and Great Britain be trained to staff this program and perform duties which would include preparing and filling cavities.

Such a program has not been established, in part probably due to the opposition of the Canadian Dental Association, who said of the program: "There is no evidence to warrant such a rash and costly duplication of the British and New Zealand plans in this country."<sup>5</sup>

Another government appointed body has recently repeated many of the Royal Commission's recommendations. The Report of the Ad Hoc Committee on Dental Auxiliaries (1970) also recommends starting a national dental care program for children. They propose that the program should utilize dental hygienists with expanded training (not a new type of auxiliary). In order to staff the program, they suggest that new schools of dental hygiene be set up at community colleges and institutes of technology. Under their recommendations, the existing university

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<sup>4</sup> General Dental Council, Final Report on the Experimental Scheme for the Training and Employment of Dental Auxiliaries (London, 1966).

<sup>5</sup> Canadian Dental Association, Statement on the Recommendations of the Royal Commission on Health Services (Toronto: Canadian Dental Association, 1965) p. 97.





programs would be expanded by one year in order to produce hygienists who would work in specialized administrative positions and as teachers of dental hygiene.

Dental hygienists are said to be overtrained for the duties they eventually perform. "It has been estimated that the amount of dental care could be increased by 25 percent if dental hygienists were utilized to the maximum extent."<sup>6</sup>

The hygienist is valuable because of her ability to do relatively complex dental work with much less training than a dentist. An examination of the competence of the dental hygienist in relation to the services that are required will help to illustrate her usefulness.

The relative value unit (R.V.U.)<sup>7</sup> has been suggested as a means of determining what duties the dental hygienist is capable of performing. Fraser has determined that "the function of the dental hygienists in Canada ... generally are assessed with a reading of 1.25 or less."<sup>8</sup> Table VIII gives an estimate of the value of the R factor for various basic dental services.

With regard to prevention, the hygienist is extremely valuable, for this rating suggests she can perform all preventive services except applying space maintaining unilateral or bilateral acrylic removable appliances.<sup>9</sup>

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<sup>6</sup>Young and Striffler, op. cit. p. 279.

<sup>7</sup>The R.V.U. (Formulated by R. Clappison, W. Pressey and R. Freeman, "Relative Value Method of Fee Determination" Journal of the Canadian Dental Association. Vol. 31 (December, 1965) gives an estimate of the time and skill needed to treat a specific dental problem. The formula is  $R \times T = R.V.U.$  T is defined as the time involved in performing the service. R is defined as the knowledge, judgement, skill and technical risk associated with the relevant service.

<sup>8</sup>Fraser, op. cit., p. 125.

<sup>9</sup>Fraser, op. cit., p. 131.



TABLE VIII

BASIC CLASSIFICATION OF RESPONSIBILITY (R) FACTORS

Class I (Factor 1)	Class II (Factor 1.25)
Amalgam restorations (one surface)	Amalgam restorations (two or more surfaces)
Dental Caries detection test	Clinical examination
Denture adjustment	Conservative periodontic treatment
Diet analysis and recommendations	Consulation and treatment presentation
Emergency treatment (palliative)	Cytological examination
Finishing restorations	Denture rebasing
Oral hygiene instruction	Denture relining
Prophylaxis	Denture repairs
Pulp testing	Diagnostic models
Radiographic examination	Displacement dressing (packing)
Recementation of inlays or crowns	Examination and diagnosis of injuries to the teeth and supporting structures
Removal of calculus (Maintenance procedure)	Emergency treatment requiring sutures
Silicate and direct resin restorations	Exposed pulp treatment
Topical application of solutions for caries control	Partial dentures
	Post-surgical treatment
	Pulpotomy
	Removal of calculus (a periodontic service)
	Removal of carious lesions and dressing



TABLE VIII (Continued)

Class III (Factor 1.50)	Class IV (Factor 1.75)
Biopsy	Advanced endodontic treatment (apical curettage, etc.)
Complete dentures	Advanced periodontic treatment
Cast metal posts and copings	Fixed bridge restorations
Crowns	Fraenectomy
Diagnosis and prescription of services	Inlays or veneers with retentive pins
Endodontic treatment	Interceptive orthodontic treatment (appliance therapy)
Gold foil restorations	Occlusal correction
Inlays (including veneers)	Reinforced amalgam restorations (pins)
Preventive orthodontics (space maintenance)	Surgical removal of erupted teeth requiring surgical flap technique
Provisional splinting (ligation)	Surgical removal of impacted teeth
Pulpotomy	
Recementation of bridge	
Surgical removal of erupted teeth	

Source: Clappison, Pressey and Freeman, op. cit., p. 764.



The R.V.U. table also suggests that the hygienist is able to perform very common treatment services such as amalgam restorations (i.e. fillings).

### Demand for Dental Hygienists

The demand for dental hygienists in private practice is a derived demand. The demand for this particular labour input is derived from the level of demand for final output (dental care); however, dental hygienists are not "... rigidly and technically linked to the amount of the product,"<sup>10</sup> since many private practitioners do not employ dental hygienists.

Table IX gives an indication of the most likely characteristics of private practice employment. Regrettably, the data is for a period in which the number of dental hygienists was much lower than at present. (i.e. There were 83 practising dental hygienists in Canada in 1962, there are now approximately 745).

From Table IX it is observed that the dental hygienist in private practice is more likely to be in a large urban area and working for a specialist (especially a periodontist, who treats forms of dental disease in the area where the teeth are embedded in the gums).

As well, the practice employing a dental hygienist is likely to have more than one dentist, and the dentists who employ her are likely to have a well established practice and be in their peak earning years (35-55).

The demand for dental care is a prime influence upon the demand for dental hygienists in private practice. The nature of the hygienists' duties influence this demand. The hygienist is a substitute to the

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<sup>10</sup> M. Friedman, Price Theory (Chicago: Aldine Publishing Company, 1962), p. 153.





dentist, and the assistant is a complement to the dentist. The dental hygienist "increases the productivity of the dentist, not by helping him perform some duties better or more rapidly but by relieving him altogether of some duties. In effect, she assumes responsibility for one stage in the treatment of a patient."<sup>11</sup> Since the hygienist is involved in only one stage of the treatment of a patient and because her performance must be supervised by a dentist, she is only capable of seeing as many patients as the dentist sees. The dentist must supervise the work of the hygienist, which contrains the productivity of the dentist. Another problem with the delegation of duties may be "the discontent felt by some persons (i.e. hygienists) who continue in middle level jobs."<sup>12</sup>

Income data indicate that dentists would demand the services of auxiliary personnel as a source of increased practice revenue. Evidence for 1963 is presented in Table X. It is also quite possible that a dentist already has increased practice revenue and a high net income when he decides to hire a dental hygienist. In other words, if the dentist is a utility maximizer, he will decide to hire a hygienist when he is overworked and has large appointment backlogs. At this point he will hire her in order to reduce his workload and maintain or augment his income. His decision to hire a hygienist is not dictated solely by profit maximizing motives.

The use of auxiliary personnel by dentists thus may not be profit motivated, but auxiliary personnel certainly do not reduce practice income. House found that "the very intensive use of auxiliaries does

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<sup>11</sup>

House, op. cit., p. 83.

<sup>12</sup>

H.K. Klarman, "Economic Aspects of Projecting Requirements for Health Manpower". Journal of Human Resources. Vol. IV. No. 3 (Summer, 1969). p. 361.



TABLE IX  
PERCENTAGE OF DENTISTS EMPLOYING  
DENTAL HYGIENISTS IN 1962

A. According to Region and Provinces

Region and province	Full-time	Part-time
ATLANTIC	0.0%	4.0%
NEWFOUNDLAND	0.0	0.0
PRINCE EDWARD ISLAND	0.0	0.0
NOVA SCOTIA	0.0	7.8
NEW BRUNSWICK	0.0	0.0
QUEBEC	0.5	0.0
ONTARIO	1.7	4.1
PRAIRIE	0.9	2.0
MANITOBA	0.0	0.0
SASKATCHEWAN	1.2	0.0
ALBERTA	1.1	3.7
BRITISH COLUMBIA	0.7	4.0
CANADA	1.1	3.0

B. ACCORDING TO CITY SIZE

City Size	Full-time	Part-time
UNDER 1,000	0.0%	0.0%
1,000 - 2,499	0.0	1.5
2,500 - 4,999	0.0	1.5
5,000 - 9,999	0.7	2.1
10,000 - 14,999	0.0	0.8
15,000 - 24,999	0.0	0.0
25,000 - 29,999	0.0	1.8
30,000 - 49,999	0.0	1.3
50,000 - 99,999	2.0	5.0
100,000 - 249,999	0.5	4.9
250,000 - 499,999	1.0	2.6
500,000 AND OVER	2.5	4.4
TOTAL	1.1	3.0



C. ACCORDING TO AGE OF DENTIST

Age	Full-time	Part-time
25 - 29	0.5%	3.0%
30 - 34	0.0	4.0
35 - 39	1.6	4.0
40 - 44	1.0	3.9
45 - 49	2.4	1.6
50 - 54	2.3	0.8
55 - 59	0.0	2.5
60 - 64	1.6	1.6
65 - 69	0.8	1.6
70 - 74	0.0	0.0
75 AND OVER	0.0	0.0
TOTAL	1.1	3.0

D. ACCORDING TO ORGANIZATION OF PRACTICE

Organization of Practice	Full-time	Part-time
PRIVATE PRACTICE	1.1%	3.0%
SOLO PRACTICE	0.9	2.3
SHARING COSTS	1.9	5.0
PARTNERSHIP	2.5	11.4

E. ACCORDING TO TYPE OF PRACTICE

Type of Practice	Full-time	Part-time
GENERAL PRACTITIONER	0.9%	2.9%
SPECIALIST	4.7	3.7
ORAL SURGEON	0.0	0.0
ORTHODONTIST	1.9	3.8
PERIODONTIST	25.0	8.3
OTHER	4.2	4.2
TOTAL	1.1	3.0

Source: Canadian Dental Association, Bureau of Economic Research, Survey of Dental Practice, 1963.



TABLE X

DENTISTS: GROSS INCOME, EXPENSES AND NET INCOME  
FROM PRIVATE PRACTICE BY NUMBER OF CHAIRS  
AND FULL TIME EMPLOYEES, 1963

Number of chairs and number and type of full-time employees	Percentage reporting dentists <sup>a</sup>	Gross Income	Expenses	Net income from private practice
<u>1 CHAIR:</u>				
No employees	11.0%	\$15,316	\$ 6,219	\$ 9,097
1 assistant	18.5	23,923	10,587	13,336
1 secretary	1.2	20,189	8,120	12,069
all other	1.0	30,394	14,831	15,563
<u>2 CHAIRS:</u>				
No employees	4.4	22,536	9,428	13,108
1 assistant	39.6	28,411	12,437	15,974
1 hygienist and 1 assistant	0.3	39,841	19,990	19,851
1 technician and 1 assistant	1.0	32,569	15,227	17,342
2 or more assistants	5.4	36,868	16,974	19,894
1 secretary	1.4	26,666	11,122	15,544
1 assistant and 1 secretary	5.0	36,053	17,065	18,988
all other	1.6	34,428	17,906	16,522
<u>3 OR MORE CHAIRS:</u>				
No employees	0.5	36,189	18,725	17,464
1 assistant	3.3	33,139	14,927	18,212
2 or more assistants	1.9	40,347	19,389	20,958
1 assistant and 1 secretary	1.4	40,665	20,371	20,294
2 or more assistants and 1 secretary	0.4	40,665	19,958	20,135
all other <sup>b</sup>	<u>2.1</u>	<u>48,427</u>	<u>26,958</u>	<u>21,469</u>
TOTAL	100.0%	\$27,723	\$12,475	

<sup>a</sup>44.3 percent of those dentists sent a questionnaire replied.

<sup>b</sup>This likely includes combinations of personnel where a hygienist works in the practice

Source: Canadian Dental Association, Bureau of Economic Research,  
Survey of Dental Practice, 1963.





not result in diminishing marginal returns to the practice."<sup>13</sup> He presented the following graph to show the net marginal contribution of auxiliary personnel to dental practice in Ontario in 1966. The large net contribution of the fifth auxiliary was a mystery to House, but he did state that this fifth person was not another dentist.

#### Demand for Auxiliaries in Public Health

Demand for dental hygienists in public health in Alberta is an administrative decision on the part of municipal authorities through their health units. Dental public health programs in Alberta are a chief method of combatting shortages of dental care in rural areas.

To administer their programs, health units receive a per capita grant from the provincial Department of Health. This grant must be matched by at least two-thirds of its amount by the contributing municipalities. A separate dental health grant, which is one-fifth of the general health services grant, can be given to the health unit if the unit decides to establish a dental health program. The type of program established is determined by the local health unit board. This board is composed of councillors from the main contributing municipalities.

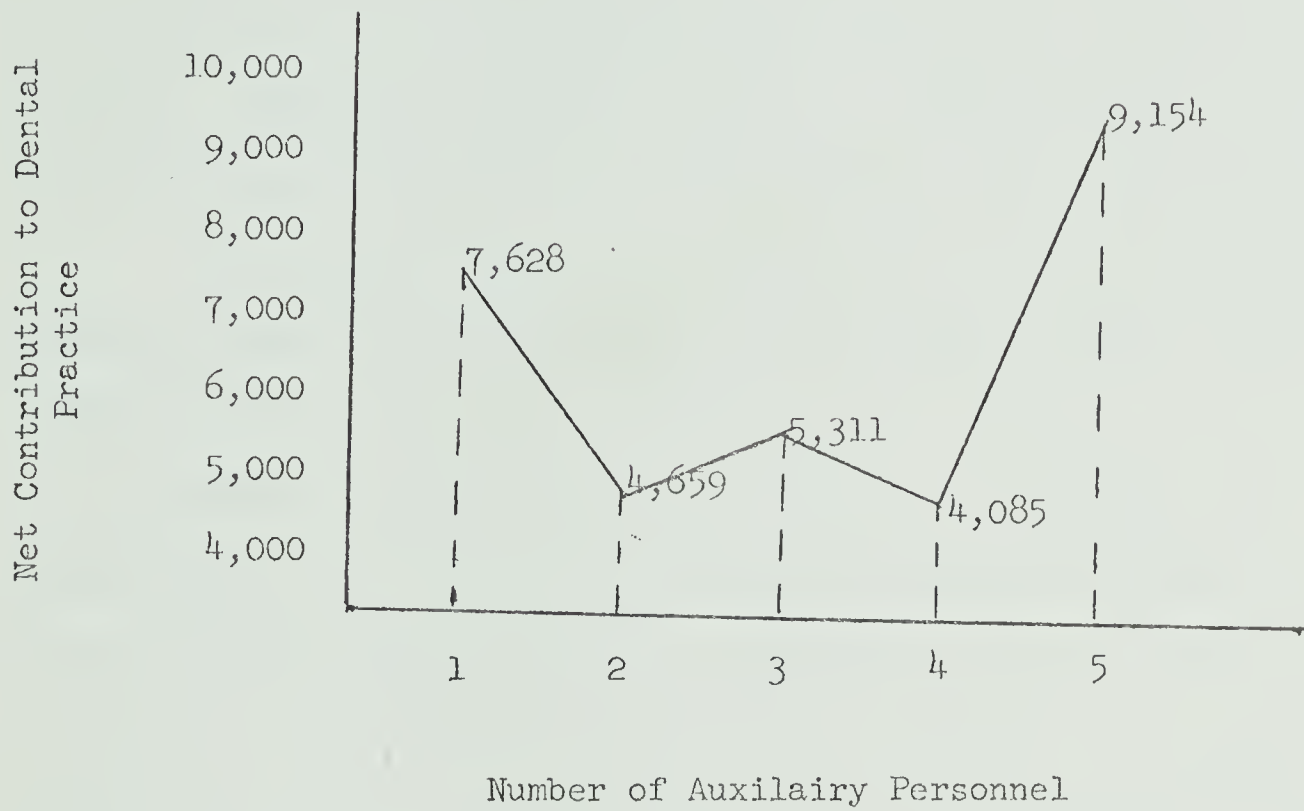
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<sup>13</sup>H.E. Klarman, "Economic Aspects of Projecting Requirements for Health Manpower." Journal of Human Resources. Vol. IV. No. 3 (Summer, 1969). p. 361.



FIGURE I

NET CONTRIBUTION OF AUXILIARY PERSONNEL TO  
THE INCOME OF THE PRACTICE (ONTARIO, 1966)



Source: House, op. cit., p. 31.



If one or more dental auxiliaries are employed, a further grant of up to ten percent of the general health services grant is given by the Department of Health. These auxiliaries are employed by the local health units, and are not provincial civil servants.

Public health dental care is concerned with bringing dental care to those who are unable to obtain dental care within the private practice setting. Programs established should "... ensure at least three essential elements of good dental care - accessibility, quality and continuity."<sup>14</sup>

The qualifications of the hygienist in preventive and educational dentistry make her an ideal public health worker; however, salary differentials between public health and private practice reduce the attractiveness of public health to the hygienist. Salaries are approximately 50 to 100 dollars per month greater<sup>15</sup> in private practice than in public health in Alberta. Blackerby cites the dilemma by stating that "If there is any speciality in dentistry for which dental hygiene has a natural affinity it is dental public health."<sup>16</sup> However, (in the U.S.) "... nearly 90 percent are employed in private dental offices, while public agencies find it almost impossible to recruit hygienists."<sup>17</sup>

This shortage of hygienists in public health is likely to be compounded should a decision be made to institute either a dental care

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<sup>14</sup> H.J. Hann, "The Basic Philosophy of the British Columbia Dental Public Health Program", Canadian Journal of Public Health, Vol. 59 (September, 1968), 342.

<sup>15</sup> Source: Conversations with Dr. A.T. Salter (Department of Health, Dental Health Services Division) and Mrs. M.B. MacLean (Head, School of Dental Hygiene)

<sup>16</sup> P.E. Blackerby, "Dental Hygiene and Dental Specialties: Public Health and Dental Hygiene", Journal of Dental Education Vol. 31 (December, 1967), 484.

<sup>17</sup> Ibid., p. 484.



program for children or a universal dental care program for all ages. Most writers suggest that the personnel to staff such programs will be those with the shortest possible training period needed for performing the required tasks.

### Supply of Dental Hygienists

The basis for suggesting that dental hygienists are in short supply is the dental hygienist to dentist ratio rather than any measure of job vacancies. In Table XI, the geographical distribution of dental hygienists is given, along with the dental hygienist to dentist ratio for 1970.

The dental hygienist/dentist ratio is not very economically meaningful, but it gives some indication of how many auxiliary personnel are being utilized. The Canadian Dental Hygienists Association<sup>18</sup> suggests that there should be one hygienist to three dentists in private practice, and three hygienists to one dentist in public health by the mid- 1980's. Thus, if their contention is accepted, the present ratios indeed indicate that dental hygienists are in short supply.

The bottleneck in the supply of hygienists would appear to be the output of dental hygiene schools, as recruitment of personnel does not appear to be the problem. "At present, Canada has a surplus of well qualified applicants wishing to become dental hygienists."<sup>19</sup> According to an eminent U.S. health economist a surplus of applicants

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<sup>18</sup> Brief of the Canadian Dental Hygienists Association (presented to the Ad Hoc Committee on Dental Auxiliary Personnel) Oct., 1968. II.  
Point 30.

<sup>19</sup> Ibid., Point 33.





TABLE XI  
GEOGRAPHICAL DISTRIBUTION OF DENTAL HYGIENISTS

PROVINCE	1962	1965	1968	1970	Dental Hygienists/ Dentist ratio for 1970
Nfld.	0	0	0	5	1/12
P.E.I.	0	2	2	8	1/14
N.S.	5	12	31	56	1/4
N.B.	0	2	3	6	1/21
Quebec	0	7	8	13	1/131
Ontario	58	116	197	377	1/8
Manitoba	1	2	24	46	1/7
Saskatchewan	7	10	14	30	1/8
Alberta	4	41	60	75	1/8
B.C.	8	19	37	130	1/7
Total for Canada	83	211	376	746	1/10

Sources: (a) 1962 - Bruce A. MacFarlane, Dental Manpower in Canada (Ottawa: Queen's Printer, 1965, p. 174).  
 (b) 1965 - Bureau of Economic Research, Canadian Dental Association, "Dental Personnel in Canada, 1965", Journal of the Canadian Dental Association (Toronto) Vol. 31, (Sept., 1965), p. 586.  
 (c) 1968 - S.G. Geldhart, "Auxiliaries and the Team Concept in Dental Manpower", Journal of the Canadian Dental Association (Toronto) Vol. 36 (Feb., 1970), p. 66.  
 (d) 1970 - Mimeographed material obtained from the Canadian Dental Association, Bureau of Economic Research, Toronto.



is tantamount to restriction of entry into a profession: "... entry (may) be restricted or the free flow of resources inhibited ... if training and educational facilities are not expanded in accord with the desires of qualified students for admission."<sup>20</sup>

Any expansion of output of hygienists would come from expanded existing schools and new schools of dental hygiene. The decision to expand output must come from government bodies. Government action in turn partly depends upon the lobbying and advice of the Canadian Dental Association and provincial dental associations, since education of hygienists is a matter of concern to the dental industry.

Since dental disease does not present a major threat to one's well being, expenditures on other types of health care personnel are more likely to be undertaken by government, given the limited funds available. The nature of dental care thus may account for the slow expansion of output.

The fact that most hygienists are women influences the supply. Typically, women have higher attrition rates than men, thus lowering long run supply. This higher attrition is attributed to the observation that many women interrupt their careers to get married, have children, and raise their families.

However, Fraser argues that this may in fact not be the reason for higher attrition rates in certain areas where women have been highly educated. He feels that in many cases women are given tasks that do not fully utilize the competence and responsibility for which they have been trained. As a result, women may become bored and dissatisfied with their jobs because the expectations of their training have not been fulfilled.

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<sup>20</sup> Fein, op. cit., p. 16.



This factor may be an important reason for the higher attrition rates in professions where women are predominant. Thus, before one can state that women have a higher attrition rate than men, one should examine the rates of attrition of "female health personnel in countries where there is a rational allocation of personnel to duties that correspond to acquired skills. The low attrition rate of the dental health nurse in New Zealand seems to substantiate this claim."<sup>21</sup>

An increase in the output of dental hygienists may in itself not be enough to reduce the costs of dental care. The resultant reduction of costs under the present system may be passed on in the form of higher incomes to dentists rather than lower fees to patients.

It is quite possible that lowering costs to society by more efficient use of personnel is only possible if the present system of providing care is changed to prevent dentists from obtaining all advantages of cost reductions.

The Ad Hoc Committee Report<sup>22</sup> suggests certain changes that would possibly reduce costs of dental care. In the process, their recommendations would also likely change the present status of dentists and dental hygienists.

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<sup>21</sup>Fraser, op. cit., pp. 226-227.

<sup>22</sup>Report of the Ad Hoc Committee on Dental Auxiliaries, Dalton Wells, chairman (Ottawa: Information Canada, 1970).



## CHAPTER FIVE

### ISSUES INVOLVED IN CHANGING THE PRESENT

#### METHOD OF PROVIDING DENTAL CARE

To this point, it has been assumed that the institutional framework is given. This assumption will be dropped, and some proposed changes in the method of delivery of dental care that may have far-reaching effects for dentists, dental hygienists and dental auxiliaries generally will be examined. Proposed changes have been suggested by the Report of the Ad Hoc Committee on Dental Auxiliaries (1970).

Their main recommendation is the establishment of a national dental care program for children and eventually a universal dental care program financed in a manner similar to medicare. Recommendations pertaining to dental auxiliaries include expanding duties of dental hygienists, allowing the Canadian Forces Dental Therapist (male and female) to work as a dental hygienist, and establishing new schools of dental hygiene at community colleges and institutes of technology. The latter recommendation also suggests that present diploma programs of dental hygiene at universities should be phased out, and in their place these facilities should be used to train teachers of dental hygiene to staff the new schools.

Fraser<sup>1</sup> has undertaken an analysis of the costs and benefits of a universal dental care program for children from birth to sixteen years of age in Ontario. His general framework begins with a discussion of the need for care, and assumes that all children in need will receive the

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<sup>1</sup>Fraser, op. cit., pp. 119-155.





required dental care. The number of children in the specified area, and the average number of cavities per child are used to determine how much care is required. The next step is an estimate of the annual amount of time per child required to treat cavities, employ preventive procedures, and give each patient oral hygiene education.

To proceed to calculating personnel requirements to deliver this amount of care in the time available in a year, he specifies the present number of dentists and dental hygienists available, and the number of expected graduates in future years. Then, an estimate is made of the amount of time each dentist and dental hygienist works in a year. From these figures, a measure of the output of dental care is derived. One must remember, however, that this output of dental care is only for dentists who are participating in the program for children.

Fraser uses the data to come up with a calculation of the shortage of dental care personnel, in terms of either dentists or dental health nurses. He does not try to ascertain what personnel requirements would be for a mixture of the two types of personnel.

His next step is a calculation of the costs of expanding output in terms of either alternative. Cost figures calculated assume that attrition rates and productivity for dentists and dental hygienists are the same.

The calculation of costs includes costs to society and costs to the student. The costs to society include costs of educating personnel, costs of additional capital equipment, and costs of maintaining personnel after they graduate. Individual costs include living expenses, tuition and books, and foregone earnings. Costs of dentists are much greater since they have a longer training period and greater foregone earnings.



Fraser's study indicates "... that the dental health nurse is a less costly alternative than the dentist for rendering the services necessary to care for the caries of children in Ontario on a universal basis."<sup>2</sup>

The study, however, makes several unverified assumptions. Equal attrition rates and equal productivity of dentists and dental health nurses would certainly be disputed by most dentists, and there is no data to indicate that these assumptions are correct. In addition, a more likely dental care program would utilize some combination of dentists and dental hygienists rather than either one exclusively.

Fraser's outline of analysis includes the costs and benefits of a program for children up to sixteen years of age. The Ad Hoc Committee Report recommends a universal program for all ages which is financed in a manner similar to the Canadian medical care program. A universal program for all ages would not only include costs of controlling caries, but would also include costs of preventing and treating periodontal disease; which has a high incidence rate in adults. A further, possibly large expense would be the cost of providing dentures to the adult population; if this service was included in the program .

A universal program would have far-reaching implications for the dental industry. More information about costs of dental care would become available, and deficiencies in care would be more evident when an administrative body oversees the payment of dentists' bills. As the amount of money spent by government on dental care increases, there would be greater pressure to make sure the money is spent efficiently.

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<sup>2</sup>Fraser, op. cit., p. 154.



This would involve measures to rationalize the industry by questioning the present allocation of duties to personnel and the present system of individual private practitioners.

Some alternative means of providing care that are possible are the following:

1. There would be an increase in the number of dental care personnel. This would include dentists and/or dental hygienists. The present method of fee for service payment would be retained, and the existing distribution of duties would not change. A long term effect could possibly be government ceilings on incomes in order to try and reduce costs.

2. There would be both an increase in the number of dental hygienists and an expansion of their allowable duties. This could take place under present fee for service arrangements, or under a system of clinics.

3. The present method of individual practitioners in their private practice framework would be phased out, and in its place a system of clinics would be established. In such a clinic, examination, diagnosis and treatment prescription would be undertaken by a senior dentist or dentists. The actual work would be performed by dentists and by dental hygienists with expanded duties. It is possible that such a clinic would be operated by the government, and all personnel would be paid on a salary basis.

Such a system would likely be opposed by dentists, for they would possibly charge that being paid by a salary implies government control of their profession. Fee for service is defended on the grounds





that "the fact that the doctor collects a fee gives him an economic interest in satisfying the patient."<sup>3</sup> The implication is that a salary would result in personnel being uninterested in the patients they serve. In addition, the possibility of outmigration of dentists would discourage the establishment of a salary mode of payment.

The argument used by the dental profession against a universal dental care plan which has a salary as the method of payment, is that "such plans apparently are detrimental both to the public and to the profession, that they may become exorbitantly expensive, and that the control and regimentation which may be imposed upon the profession encourage mediocrity."<sup>4</sup>

Such a plan will likely be adopted in future years if the dental profession itself takes no steps to provide more efficient service now. Mere opposition by dentists to any change will not ensure more efficient service. Dentistry must take the initiative in improving delivery of care if it wishes to preserve its present position of freedom of the individual dentist: "How effectively dentistry rises to the challenges of reidentification of goals, reorganization and streamlining of delivery, and readjustment of priorities may well determine the future of free enterprise dental practice."<sup>5</sup> In order to improve efficiency, "... there is urgent need for the (dental) profession to design and promote preventive programs, advance more efficient treatment possibilities,

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<sup>3</sup>H. Schwartz, "Health Care in America: A Heretical Diagnosis", Saturday Review, Vol. LIV (August 14, 1971), p. 16.

<sup>4</sup>M.A. Fisher, "New Directions in Dentistry" American Journal of Public Health, Vol. 60 (May, 1970) p. 853.

<sup>5</sup>Ibid. p. 848.

<sup>6</sup>Ibid. p. 853.





explore expanded uses for dental auxiliaries, and stimulate the search for lower treatment costs."<sup>6</sup>

Before any of these changes could take place, a study of the optimal division of duties between dentists, dental hygienists and other auxiliary personnel would be needed in order to develop an efficient allocation of resources in a dental office.

Given a shortage in dental care and the long lag involved in training dentists, it would be advantageous to shift duties to lesser trained auxiliary personnel; providing auxiliary personnel have working lives as long as those of dentists. Fraser assumes attrition rates for hygienists are approximately equal to those of dentists, but other authors (including House) dispute this claim. Higher attrition rates would remove much of the advantage of a shorter training period.

"Certainly, with the same resources more hygienists could be produced in any year than dentists, but the pool of hygienists would not necessarily grow faster than the pool of dentists. One reason is that the working life of the hygienist is probably less than half that of the dentist."<sup>7</sup> Fraser and House differ in their estimates of working lives of hygienists, and one cannot accept either one's contention in the absence of reliable data.

In order to ensure that quality does not fall below an acceptable level, the division of duties must be set at a level ensuring both adequate quantity (as many duties as possible performed by auxiliary personnel), and adequate quality (ensuring auxiliary personnel can

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<sup>6</sup>Ibid. p. 853.

<sup>7</sup>House, op. cit., p. 84.



perform all assigned duties competently). By using an assessment of required competence similar to the R factor in the relative value unit (R.V.U.) method, the division of duties between personnel could be established. Then it would be necessary to estimate what is done in a 'typical' private practice office in a given day, and the amount of time each service takes. From this information, some estimate could be made of the proportion of work that could be performed by lesser-trained personnel if they were allowed to perform all duties within their competence. This would result in a desirable ratio of auxiliary personnel to dentists in an efficient office.

Such a procedure would be open to the criticism that it is difficult to determine the complexity of some tasks, and any rating system would be too arbitrary to ensure that all tasks on the borderline of complexity could be capably performed by a hygienist. The powerful argument of maintaining quality would probably result in pressure from dentists to set the division of tasks at a lower level than would be suggested by an outside advisory body. As well, it is doubtful whether or not a composite of tasks for an average office for any given day would be accepted as valid by many dentists.

It should be noted that costs of a public dental care program would likely escalate to unacceptable levels if no provision is made to encourage proper preventive care by the individual in the form of diet and brushing precautions; "... one must keep in mind that the key to improving dental health is individual motivation. Even if a mouth has been restored to health by treatment, neglect of proper oral hygiene and failure to seek professional services soon will reduce the mouth to



its former condition. When this occurs in a public health dental program the expenditure of community funds may be considered largely wasted."<sup>8</sup>

These problems emphasize the caution which must be exercised in any attempt to calculate costs and benefits of future programs. Primary effects can be estimated but secondary effects may include certain variables that have not been considered. Before public health officials can predict ultimate costs, these effects must be taken into account.

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<sup>8</sup>Ibid., p. 91.



## CHAPTER SIX

### SUMMARY AND CONCLUSIONS

#### Summary

Information on the nature of dental care, and shortages of dental care personnel is used to explore questions that are the concern of public health planners and the dental profession.

Fundamental questions that have been dealt with include the relative merits of prevention compared to treatment; quality of output compared to quantity of output; and individual choice versus government intervention in providing dental health services. These questions must be considered when contemplating methods to increase the efficiency and level of health services.

#### Conclusions and Implications

To alleviate the shortages of dental care in Canada, auxiliaries must be used more efficiently. In order to improve efficiency, a more rational allocation of duties must be adopted. A universal dental care program financed similarly to medical care is likely to be adopted reasonably soon in Canada. Such a program will raise the demand for care, and output will have to expand drastically. New methods of practice will have to be adopted in order to use present personnel at their most efficient level. As well, many more new personnel will have to be trained. These personnel are urgently needed, and their training period must not be too long in relation to their ultimate duties. Quality must be maintained, but quantity of care is also of fundamental importance, and cannot be dismissed completely as a competing goal.





This study has pointed out certain issues involved in shortages of dental care and the removal of shortages.

It cautions health planners to look beyond the claims of the dental profession relating to the maintenance of quality. The status quo need not be maintained for its own sake. This is especially true when one sees that the free market has failed in providing an adequate output of dental care. Changes are needed in order to meet the impending worsening of shortages that would probably result if a national dental care program is adopted.

The conclusions reached are tentative, but before more authoritative statements can be made, additional information is required concerning the production of dental care. This would include information relating to the substitution between personnel, the division of tasks within a practice, and the nature of tasks performed in a typical practice during a day. Reliable data on attrition rates and the time path of the work life of various personnel are also required.



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